for the latitude, longitude, altitude and velocity data must be capable of providing position updates synchronized to the UTC Time Mark at a minimum of a one second update rate. The position updates must be recomputed each one second according to the velocity data required by the test procedure. The position data must be provided to the UAT Transmitting equipment within 200 milliseconds of the UTC Time Mark. The UTC Time Mark or its equivalent will serve as the synchronization for all of the timing measurements. The transmitted messages from the UAT Transmitting equipment must be received and decoded by the appropriate receiving equipment with either the capability of internally tagging time of message receipt within 1 millisecond of the time of message receipt relative to the UTC Time Mark or of providing an external signal representing the time of message receipt for an external time measurement. External timing relative to the UTC Time Mark is required to measure the elapsed time with a resolution of 100 nanoseconds or better.

Measurement Procedure:

Step 1:   Verify Data Updates Prior to 200 Milliseconds of the Transmission Time

Set up the UUT to transmit ADS-B Messages. Input an ADS-B Message and update the input values each second at least 200 milliseconds prior to the next scheduled message transmission. Verify that each transmitted message reflects the updated values input each second.

Step 2:   Verify Data Updates Within 200 Milliseconds of the Transmission Time

Set up the UUT to transmit ADS-B Messages. Input an ADS-B Message and update the input values each second within 200 milliseconds of the next scheduled message transmission.

Verify that if the updated values are not reflected in the next transmitted message, then they are reflected no later than the message following that one and likewise for each subsequent input.

2.4.7.2.3   Verification of Requirements when Non-UTC Coupled (§2.2.7.2.3)

Purpose/Introduction:

When the UAT Transmitting Subsystem is in the Non-UTC Coupled Condition~~:~~,

~~Any~~ any change in an ADS-B Message field provided to the transmitter **shall** be reflected in any transmitted message containing that message field that is transmitted more than 1.0 second after the new value is received by the transmitter.

~~b.~~a. No extrapolation of position **shall** be performed in this condition.

Note: *~~Even though no extrapolation of position is performed when non-UTC Coupled, the~~A UAT Transmitting Subsystem that is capable of meeting the requirements of §2.2.7.2.2 makes no adjustment to the NIC or NAC that it receives as inputs. ~~Also, it~~It is not expected that a single transmitted message would ever indicate both the Non-UTC Coupled condition and a NIC or NAC_P consistent with the Precision condition.*

Equipment Required:

The test configuration must include data sources to be provided at the input interfaces of the UAT Transmitting equipment so that the appropriate data is available and loaded into the corresponding fields in the transmitted message. Equipment that serves as a source for the latitude, longitude, altitude and velocity data must be capable of providing position updates synchronized to the UTC Time Mark at a 1 second update rate. The position updates must be recomputed each second according to the velocity data required by the test procedure. The UTC Time Mark or equivalent will serve as the synchronization for all timing measurements even though the UUT will not be provided the UTC Time Mark. The transmitted messages from the UAT Transmitting equipment must be received and decoded by appropriate receiving equipment with either the capability of internally tagging time of receipt within 1 millisecond time of receipt relative to UTC Time Mark or of providing an external signal representing time of receipt for external time measurement. External timing relative to the UTC Time Mark is required to measure elapsed time with a resolution of 100 nanoseconds or better. Disconnect the UTC Time Mark from the ADS-B Transmitting System so that the UUT is Non-UTC Coupled.

Measurement Procedure:

Step 1: Verify Latitude and Longitude Data

Set up the UUT to transmit ADS-B Messages. Initialize the equipment providing position data to the UUT to the following conditions:

Longitude:	30.0	degrees	WEST
Latitude:	60.0	degrees	NORTH
N/S Velocity:	1,200	knots	SOUTH
E/W Velocity:	1,200	knots	WEST

Initialize the UUT and after stable, apply the initial position values to the equipment. Provide latitude, longitude and altitude data at the input interface to the UUT and record the time that the information is input to the UUT. The UTC Time Mark prior to the first position data is the initial data collection point at the output of the UUT. Take 60 consecutive samples and record the Time Of Receipt of each transmitted message. Verify that for each reported latitude and longitude in each of the messages, the latitude and longitude values reported in the transmitted message reflects the last input values prior to the transmitted message or the previous input values input the prior one-second interval.

Step 2: Verify No Extrapolation of Position Data

Set up the UUT to transmit ADS-B Messages. Initialize the equipment providing position data to the UUT to the following conditions:

Longitude:	30.0	degrees	WEST
Latitude:	60.0	degrees	NORTH
E/W Velocity:	1,200	knots	WEST
N/S Velocity:	1,200	knots	NORTH

Initialize the UUT and after stable, apply the position values to the equipment. Provide latitude, longitude and altitude data at the input interface to the UUT

~~without updating the position data, i.e., keep the position data static. The UTC Time Mark prior to the first position data is the initial data collection point at the output of the UUT. Take 60 consecutive samples and compare the reported Longitude in the UAT Transmitted Message to the input Latitude/Longitude data. Verify that the Latitude/Longitude data transmitted is within 1.25 meters of the input Latitude/Longitude.~~

Step ~~3~~2: Verify Updates For All Other Data

Set up the UUT to transmit ADS-B Messages. For each of the applicable input elements in Table 2-64 for the equipage class under test, provide the applicable input element at its nominal input rate. Verify that the input values received one second or more prior to the transmission time are reflected in the transmitted messages.

2.4.7.2.4   Verification of Data Timeout (§2.2.7.2.4)

Appropriate test procedures required to validate the requirements of §2.2.7.2.4 are included in the respective subparagraphs identified in each line item of Table 2-98.

2.4.8   Verification of Receiver Characteristics (§2.2.8)

No specific test procedure is required to validate §2.2.8.

2.4.8.1   Verification of Receiving Diversity (§2.2.8.1)

Appropriate test procedures required to validate the requirements of §2.2.8.1 are included in §2.4.8.1.1 and §2.4.8.1.2.

2.4.8.1.1   Verification of Full Receiving Diversity (§2.2.8.1.a and §2.2.8.1.b)

Purpose/Introduction:

"Receiving diversity" refers to an ADS-B Receiving Subsystem's use of signals received from either the top antenna, or the bottom antenna, or both antennas. For the purpose of these requirements, several alternate ADS-B Receiving Subsystem architectures that employ receiving antenna "diversity" are illustrated in Figure 2-8.

a. Full receiver and message processing function diversity:

(see Figure 2-8, part a.)

There are two receiver input channels, each with its own receiver front end, message synchronization, bit demodulation, and FEC decoding. All Successful Message Receptions from both channels **shall** be provided to the Report Assembly function. In the event both channels result in Successful Message Reception of identical messages, a single copy of this message may be provided.

b. Other diversity techniques: Other diversity implementations may be used. Any implementation must demonstrate equivalent or better performance to (a) above.